# Evaluation of Sound Therapy Tinnitus Treatment

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## Background

The most current data indicate that tinnitus and hearing impairment are the number 1 and 2 disabilities associated with service in Operations Iraqi Freedom and Enduring Freedom (OIF/OEF). Both injuries can result from exposure to blast or impulse noise from friendly- or opposing-forces weapon systems. Thus, tinnitus caused by acute acoustic trauma and traumatic brain injury (TBI) is an obstacle to overcome in return to duty decisions and represents a serious hazard to the retention of a healthy and fit force.

## Objective

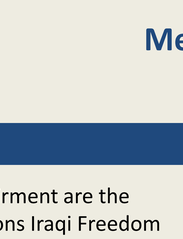
Provide medical authorities a recommendation regarding novel treatments for debilitating tinnitus adversely affecting Soldier deployability and operational performance.

## Methods

This study was a between-subjects design in which the experimental group was treated with the Neuromonics *Oasis*™ tinnitus treatment device and Neuromonics' counseling protocol ($n$ = 30 active duty personnel). The control group was treated with an iPod Touch® with downloaded tinnitus applications and followed the Tinnitus Retraining Therapy (TRT) protocol ($n$ = 10 active duty personnel). Both devices were used in conjunction with Bang & Olufsen® earphones.

Dependent variables for both groups were the Tinnitus Reaction Questionnaire (TRQ), the Tinnitus Handicap Inventory (THI), measures of tinnitus awareness and tinnitus disturbance, broad band noise minimum masking levels (BBNMML), and loudness discomfort levels (LDLs).

### Neuromonics *Oasis*™ Tinnitus Treatment



**Treatment: Stage 1**

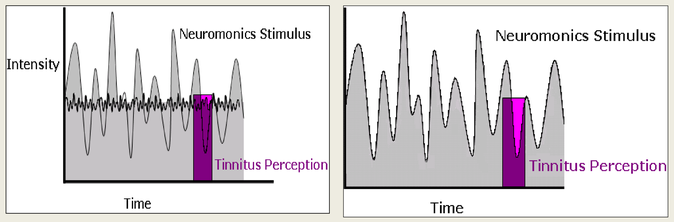
Relief and reduction of tinnitus awareness during listening sessions

Facilitates relaxation and a sense of control

**Treatment: Stage 2**

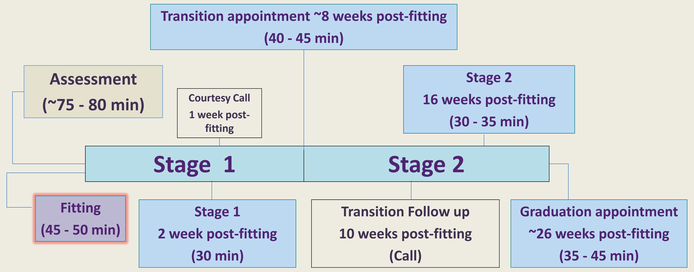
Retrain the brain to promote less awareness and disturbance by tinnitus

The presumed mechanism is neuroplasticity of the brain



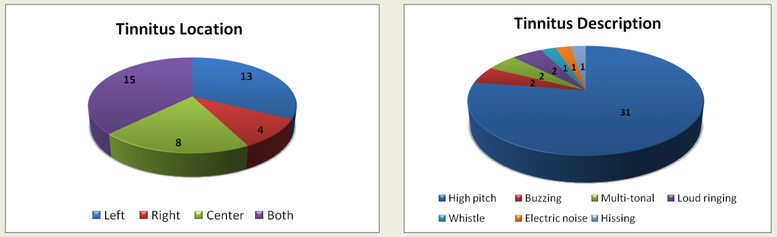

### iPod Touch with tinnitus applications and TRT Protocol


## Chronology of Appointments *



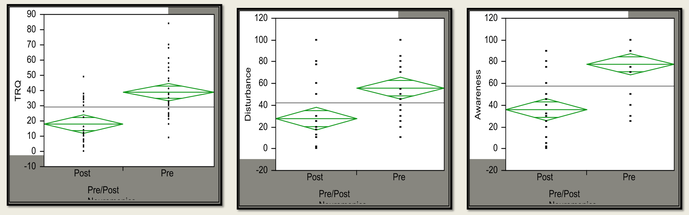

* Flowchart modified from Neuromonics training materials. The length of treatment averaged 9 ½ months due to the nature of military training and deployment schedules.

## Results



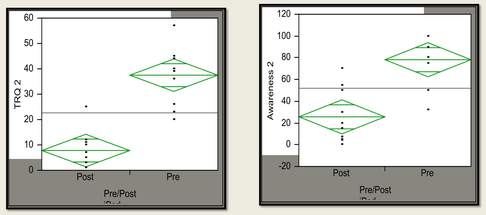

Tinnitus Characteristics

Analysis of tinnitus measures indicates that the Neuromonics tinnitus treatment strategy was effective, showing statistically significant reductions in the negative effects of tinnitus as measured by pre- and post-treatment TRQ, tinnitus disturbance, and tinnitus awareness.




Neuromonics *Oasis*™ Tinnitus Treatment significant findings ($p < 0.05$)

Similar findings were evident with the iPod tinnitus treatment strategy, with statistically significant differences in pre- and post-treatment measures of TRQ and tinnitus awareness. There was not a significant difference in the pre- and post-treatment measures of tinnitus disturbance in the iPod tinnitus treatment group.




iPod Touch® with tinnitus apps and TRT Protocol significant findings ($p < 0.05$)

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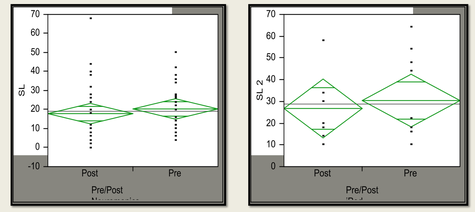
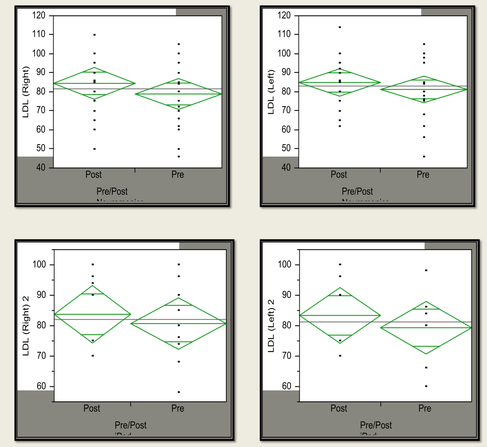
Analysis of BBNMMLs and LDLs did not indicate statistically significant differences between pre- and post-treatment for either group, suggesting no overall change in either the amount of masking needed to blend with the participants' tinnitus or the participants' tolerance for loud sounds.




Broad Band Noise Minimum Masking Level results ($p > 0.05$)




Loudness Discomfort Level results ($p > 0.05$)

## Conclusions

Both the Neuromonics tinnitus treatment and the iPod downloaded applications in conjunction with the Tinnitus Retraining Therapy protocol appear effective for the alleviation of debilitating tinnitus that adversely affects military operational performance and for reducing associated subjective negative effects of tinnitus on the quality of life.

It is possible that no overall change was evident for BBNMMLs or LDLs due to the nature of our noise-exposed population, despite continued use of hearing protective devices. A few participants experienced dramatic reductions in the amount of energy necessary to blend with their tinnitus (both treatment groups).

Of note, it became apparent that use of both the THI and TRQ was redundant due to virtually identical questions and correlation of scores.

These data should be interpreted cautiously due to the small sample size and unequal groups. Furthermore, care should be taken not to draw a premature conclusion as to the permanency of the treatment effect at this time (especially with the iPod group). Future research is warranted with larger, equal sample sizes, coupled with pre- and post-treatment imaging studies to identify and evaluate objective measures of neuroplasticity.

## References & Acknowledgments

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References available upon request.